

SECAMONE R. BR. (ASCLEPIADACEAE: SECAMONOIDEAE) IN AUSTRALIA

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Summary

Secamone is represented in Australia by a single variable species, *S. elliptica* R. Br. which also occurs in Malesia. Lectotypes are designated for *S. elliptica* and the synonyms *S. ovata* R. Br. and *S. papuana* Warb. *S. lanceolata* Blume, *S. micrantha* (Decne) Decne, *S. attenuata* Decne, *S. multiflora* Decne and *S. flavida* Schltr. are newly placed in synonymy. An illustrated taxonomic account with notes on variation, distribution, ecology, habitat and conservation status is given.

Introduction

Taxa included within the subfamily Secamonoideae (Asclepiadaceae) are characterised by the anthers being dithecal and tetrasporangiate, with two pollinia in each theca (Schill & Jäkel 1978). Thus the Secamonoideae differ from the two other subfamilies of Asclepiadaceae in having 4 pollinia per pollinarium, as opposed to 2 in the Asclepiadoideae and an aggregation of granular pollen in the Periplocoideae.

Floral development in species of *Secamone* has been extensively investigated, primarily by Safwat (1962) but also by Puri and Shiam (1966). Safwat (1962) outlined in detail how the bilocular anthers of the Asclepiadoideae (as Cynanchoideae) are a result of phylogenetic suppression of the two outer locules of each anther, whereas in 4-celled anthers in the Secamonoideae no suppression has occurred. In *Secamone*, the entire style-head is glandular in comparison to the 5 glandular regions found in the Asclepiadoideae.

The genus *Secamone* R. Br. was first validly described in Brown (1810a) and not in Brown (1810b) as listed in Farr *et al.* (1979). Brown (1810b) was issued as a preprint of Brown (1811) and was intended to be simultaneously published with Brown (1810a), but the Prodrômus predates the preprint by some seven days (Mabberley 1985). As listed in Farr *et al.* (1979), Phillips (1951) lectotypified *Secamone* with *S. emetica* (Retz.) R. Br. ex Schultes based on *Periploca emetica* Retz. The combination was not effectively published in *Secamone* until 1820; however it is quite clear that Brown (1810b) included the taxon it refers to within his concept of *Secamone*, despite his not formally transferring the name. Hence it is not considered necessary to relectotypify with a type specimen of one of the names published in Brown (1810a).

Species of *Secamone* are widely distributed in Africa, India, south-east Asia and New Guinea with two species (*S. elliptica* R. Br. and *S. ovata* R. Br.) having been described from Australia (Brown 1810a). No critical account of *Secamone* in Australia has been provided since that of Bentham (1869) who accepted both of Brown's species. Bentham's treatment was copied by Bailey (1900). Bentham commented that *S. ovata*, the second of the two species described by Brown in his Prodrômus, was doubtfully distinct, differing from *S. elliptica* only in the broader, more ovate and obtuse or scarcely acute, shortly petiolate leaves.

Materials and Methods

Herbarium material at BRI, BRIU, CANB, DNA, JCT, LAE, MEL, NSW (partial holdings only), NT, PERTH, QRS and photographs or microfiches of types at BM, K, G and P were examined. Information on material at B and L were obtained from the Directors or relevant staff of those institutions. Material was collected or procured

throughout the species' range in Australia. In the citation of specimens, preference has been given to fertile collections that demonstrate the variation in the species and cover its geographic range. Material preserved in spirit is indicated by an *. No index to collectors has been included as most material in Australian herbaria has now been determined.

Taxonomic Treatment

Secamone R. Br., Prod. 464 (1810). **Type:** *Periploca emetica* Retz. (*S. emetica* (Retz.) R. Br. ex Schultes) (lecto, *fide* Phillips 1951).

Asclepiadeae 44 (1810); Mem. Wern. Nat. Hist. Soc. 1: 55 (1811); Blume, Bijdr. 1049–1051 (1826); Decne, Ann. Sci. Nat. Bot. 343 (1838); Decne in DC., Prod. 8: 500–504 (1844); Miq., Fl. Ned. Ind. 2: 471–474 (1856); Wight, Contr. bot. India 60 (1834); Endl., Gen. pl. 8: 589 (1838); Walp., Ann. bot. syst. 3: 48 (1852); Benth., Fl. austral. 4: 327–328 (1869); Benth. in Benth. & J.D. Hook., Gen. pl. 2: 746 (1876); J.D. Hook., Fl. Brit. India 4: 12–13 (1885); K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4(2): 261–263 (1897); Schltr., Bot. Jahrb. Syst. 50: 89–90 (1914); Merrill, Enum. Philipp. fl. pl. 3: 342–343 (1923); Ridley, Fl. Malay Penins. 2: 375 (1923); Backer & Bakhuizen van den Brink, Fl. Java 2: 254 (1965); H. Huber, Rev. Handbk. Fl. Ceylon 4: 88–89 (1983).

Derivation of Name: From the Arabic name for one species.

Woody lianes with white latex. Stems slender to thickened with corky outgrowths, twining or trailing, glabrous. Roots fibrous. Leaves flattened in cross-section, coriaceous or herbaceous, opposite, margins entire, glabrous (occasionally pubescent), extrafloral nectaries lacking or present at lamina base, petiolate with small stipular structures at base. Cymes appearing at nodes between the pair of leaves, 1–many-flowered. Sepals 5, distinct, generally with glands at base of lobes. Corolla deeply 5-lobed, subrotate, petals contorted in bud, right hand edges overlapping. Staminal corona of 5 laterally compressed lobes, adnate to the base of the staminal column. Stamens inserted at corolla-tube base, connate; anthers with short incurved terminal membrane. Pollinaria each with 4 pollinia; pollinia smooth, erect, 2 in each anther theca, globose or ellipsoid; corpusculum rounded; caudicles flattened and very short. Gynostegium flat-topped to umbonate with obtuse or capitate style-head enclosed by stamens; ovaries free, glabrous. Follicles lanceolate to ovoid or angular, smooth or roughened; triangular to semi-terete in cross-section, often paired. Seeds flat, ovate, brown, comose at germinating end only.

One species in Australia. Worldwide *ca* 20 species.

Secamone elliptica R. Br., Prod. 464 (1810). **Type:** Carpentaria, Groote Islands [Queensland], 4 January 1803, *R. Brown* 8 [Iter Australiense 2871] (lecto (designated here): BM(piece directly in middle of sheet); isolecto: BRI(AQ333111), MEL(MEL1553064)).

Sprengel, Syst. veg. 1: 837 (1825); Decne in DC., Prod. 8: 504 (1844); Benth., Fl. austral. 4: 327 (1869); Bailey, Cat. pl. Queensl. 30 (1890); Queensl. fl. 3: 997–998 (1900); Compr. cat. Queensl. pl. 325 (1913); Maiden & Betche, Census New South Wales pl. 174 (1916); Williams & Harden, Rainforest Climbing pl. 39 (1980); Jacobs & Pickard, Pl. New South Wales 70 (1981); Williams, Students fl. N.E. New South Wales 5: 721–722 (1984); Williams, Native pl. Queensl. 2: 258–259 (1984); Green, Census vasc. pl. Western Austral. 145 (1985); Dunlop, Checklist vasc. pl. Northern Territory 9 (1987).

Secamone ovata R. Br., Prod. 464 (1810) **synon. nov.** **Type:** Coen River, Carpentaria [Queensland], 6 November 1802, *R. Brown* 9 [Iter Australiense 2870] (lecto (designated here): BM(2 sheets); isolecto: CANB).

Sprengel, Syst. veg. 1: 837 (1825); Benth., Fl. austral. 4: 328 (1869); Bailey, Cat. pl. Queensl. 30 (1890); Queensl. fl. 3: 998 (1900); Compr. cat. Queensl. pl. 325 (1913).

Secamone lanceolata Blume, Bijdr. 1051 (1826) **synon. nov.** **Type:** Java (*fide* Bakhuizen van den Brink 1950).

Bakhuizen van den Brink, Blumea 6: 371 (1950); Backer & Bakhuizen van den Brink, Fl. Java 2: 254 (1965).

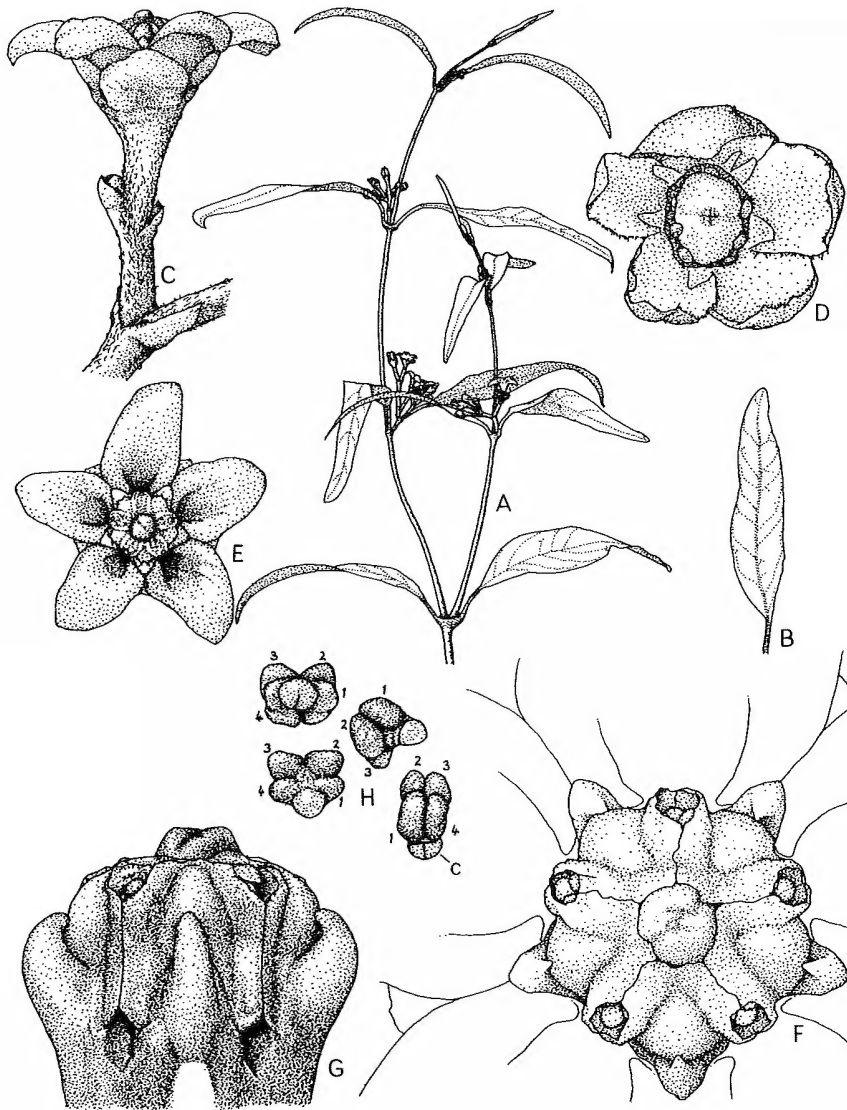


Fig. 1. *Secamone elliptica*: A. flowering shoot with little branched cymes $\times 1$. B. leaf $\times 1$. C. single flower $\times 10$. D. flower with gynostegium and corolla removed showing ovaries and glands at sepal bases $\times 20$. E. apical view of flower $\times 10$. F. apical view of staminal corona $\times 40$. G. side view of staminal corona with style-head protruding $\times 40$. H. Pollinaria in rotating sequence (c = corpuscle) $\times 70$. All from Forster 988.

- Secamone micrantha* (Decne) Decne, Etud. Ascl. Ann. Nat. (1838), in DC., Prod. 8: 501 (1844) **synon. nov.** *Tylophora micrantha* Decne, Nouv. Ann. Mus. Hist. Nat. 3: 377 (1834). **Type:** Timor, 1821, *Spanoghe* s.n. (syn: G, 3 sheets (photo!); isosyn: K(photo!), MEL(MEL1553191); Timor, *Zippel* s.n. (syn: G[microfiche!]; isosyn: K(photo!), P(photo!); Java, *Zollinger* s.n. (syn: P(photo!); [Java] Soerakarta, 1802–1818, *T. Horsfield* s.n. (isosyn: K(photo!)).
Miq., Fl. Ned. Ind. 2: 472 (1856); Craib, Bull. Misc. Inform. 1911: 415 (1911); Cost. in Lecomte, Fl. Indo-Chine 4: 41 (1912); Ridley, Fl. Malay Penins. 2: 375 (1923); Tsiang, Sunyatsenia 4: 57 (1939).
- Secamone attenuata* Decne in DC., Prod. 8: 501 (1844) **synon. nov.** **Type:** Philippine Islands, Island of Mindoro, *H. Cuming* 1536 (holo: G; iso: BM, K(2 sheets, photo!), P(2 sheets, photo!)).
Miq., Fl. Ned. Ind. 2: 472 (1856); Vidal, Phan. Cuming. philipp. 127 (1885), Revis. pl. vasc. filip. 187 (1886); Merrill, Enum. philipp. fl. pl. 3: 342 (1923).
- Secamone multiflora* Decne in DC., Prod. 8: 501 (1844) **synon. nov.** **Type:** Philippine Islands, Province of Cagayan, Luzón, *H. Cuming* 1284 (iso: BM, BRI(AQ333115), K(2 sheets, photo!), L, MEL(MEL1553192), P(2 sheets, photo!)).
Miq., Fl. Ned. Ind. 2: 472 (1856); Vidal, Phan. Cuming. philipp. 127 (1885), Revis. pl. vasc. filip. 187 (1886); Merrill, Enum. philipp. fl. pl. 3: 342 (1923).
- Secamone papuana* Warb., Bot. Jahrb. Syst. 18: 206 (1894). **synon. nov.** **Type:** "Dutch New Guinea", 1888, *O. Warburg* 21322 (lecto (here designated): BRI; isolecto: A(n.v.)).
- Secamone flavida* Schltr., Bot. Jahrb. Syst. 50: 89–90 (1914) **synon. nov.** **Type:** Nordöstl. Neu-Guinea: liane in den Wäldern am Minjem-Thor, February 1908, *R. Schlechter* (B †).
- Cynanchum dichasiale* O. Schwarz in Feddes Repert. Spec. Nov. Regni Veg. 24: 94 (1927). **Type:** *Bleeser* 586 (syn: B, n.v.; isosyn: NSW); Darwin, *Bleeser* 244 (syn: B, n.v.; isosyn: MEL).
Blake, Proc. Roy. Soc. Queensland 59: 168 (1948).
- [*Secamone emetica* auct. non (Retz.) R. Br. ex Schultes: F. Muell., Fragm. 5: 161 (1866).]

Woody liane. Stems green when young, with age there develops grey, hard, fissured bark; up to 10 cm diameter, up to at least 10 m long, twining, much branched. Leaves herbaceous, glabrous or with sparse indumentum of uniseriate hairs; lamina elliptic, narrow-elliptic, lanceolate or ovate, 20–60 mm long, 6–35 mm wide, tip acuminate or acute, base acute or rounded; petiole 3–8 mm long, 0.5–1 mm diameter. Cymes with few to many branches, borne on first 4 or 5 nodes below apex, up to 2 cm wide; peduncle 2–3 mm long, 0.75 mm diameter, finely pubescent with uniseriate hairs. Flowers 2 mm long, 2–5 mm diameter; pedicels 2–4 mm long, 1 mm diameter, finely pubescent with uniseriate hairs. Sepals 0.75–1.5 mm long, 0.75–1.5 mm wide, ovate, finely pubescent, 0–3 glands present at base. Corolla lobes reflexed, with a concave base, obtuse, glabrous, greenish yellow, 1.5–2 mm long, 1.25–1.5 mm wide. Staminal corona 1.25–1.5 mm long, 1.25–1.5 mm diameter; corona lobes adnate to base of anthers, curving inwards, subulate-cylindrical, 0.25–0.75 mm long, 0.2–0.25 mm diameter. Staminal column 1.5 mm long, 1 mm wide; anther appendages 0.25 mm long, 0.25 mm wide; slit between anther wings 0.5–0.75 mm long. Style-head projecting past anther connectives, flattened globose, 0.25–0.5 mm long, 0.3 mm diameter. Ovaries 0.5 mm long, 0.5 mm wide (both). Pollinaria 0.20 mm long, 0.20 mm wide, golden; pollinia (singly) 0.12–0.13 mm long, 0.07–0.08 mm wide; corpusculum 0.10–0.11 mm long, 0.07–0.10 mm wide; caudicles 0.10 mm long, 0.02 mm wide. Follicles terete-ovoid, 40–100 mm long, 7–13 mm diameter; seed ovate, tan, 7–10 mm long, 2–3 mm wide; coma 23–35 mm long.

Selected specimens: **Philippine Islands.** MINDANAO: Buayan, Cotabato Province, Apr 1932, *Ramos & Edano* 85131 (BRI). **Timor.** Port Timor, E of Manotutu, Dec 1953, *van Steenis* 18007 (CANB). **Papua New Guinea.** Tarara, Wassi Kussa, Dec 1936, *Brass* 8501 (A.BRI); Tavai Ck area, ca 43 miles [71 km] SE of Port Moresby, 9°44'S, 147°26'E, May 1967, *Pullen* 6878 (A.CANB, L.LAE); Yule Is, 8°50'S, 146°32'E, *Womersley & Simmonds* NGF7107 (CANB, LAE). **Australia.** **Western Australia.** Broome Harbour, 17°58'S, 122°14'E, Jan 1971, *Allan* 597 (CANB, PERTH); Walsh Pt, Port Warrender, Admiralty Gulf, 14°34'S, 125°51'E, Jan 1982, *Kenneally* 7824 (CANB, PERTH). **Northern Territory.** East Pt, Darwin area, 12°24'S, 130°56'E, Jan 1988, *Stobo* [AQ408478] (BRI*); Channel Pt, 13°10'S, 130°08'E, Nov 1982, *Wightman* 329 & *Dunlop* (CANB, DNA*, MEL, PERTH). **Queensland.** COOK DISTRICT: Mapoon – lily lagoon, S of Cullen Point (Port Musgrave), 11°59'S, 141°52'E, Jun 1981, *Morton* AM1265 (BRI, MEL); Eastern Beach beyond Pearling Stn, Paki Is, 10°44'S, 142°13'S, Jan 1987, *Gumess* 2100 (BRI*). **NORTH KENNEDY DISTRICT:** 40 Mile Scrub, 18°01'S, 144°45'E, Jan 1972, *Hyland* 5888

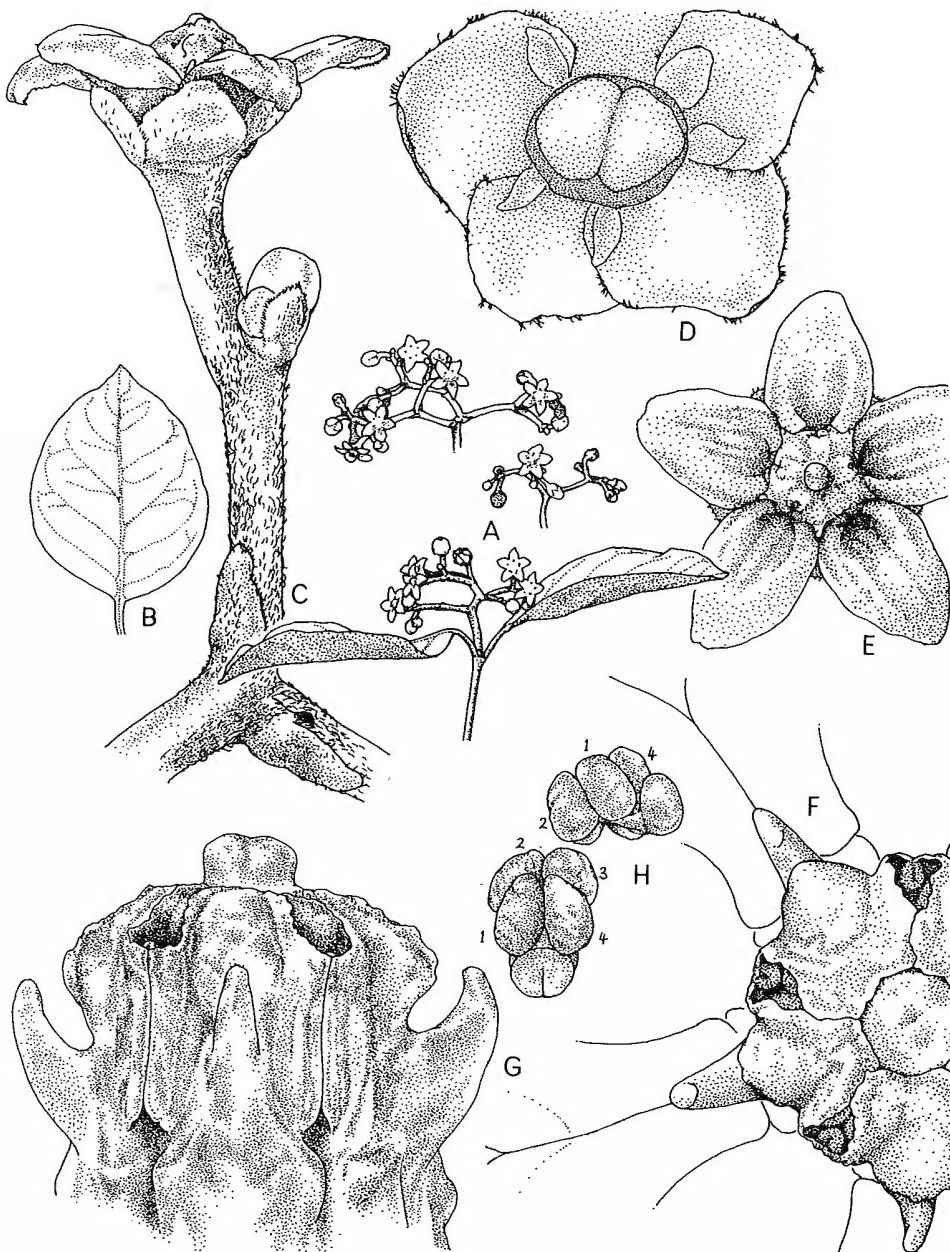


Fig. 2. *Secamone elliptica*: A. tip of flowering stem & two other separate cymes demonstrating much branched nature $\times 1$. B. leaf $\times 1$. C. single flower $\times 10$. D. flower with gynostegium and corolla removed showing ovaries and glands at sepal bases $\times 20$. E. apical view of flower $\times 10$. F. apical view of staminal corona $\times 40$. G. side view of staminal corona with style-head protruding $\times 40$. H. pollinaria in rotating sequence $\times 70$. All from Guinness 2100.

(BRI,CANB,QRS); Fletcher Ck, 2 km SW of Mt Keelbottom, 19°49'S, 146°05'E, Mar 1988, *Forster & Bolton* 3620 (BRI*). MITCHELL DISTRICT: near Jericho, Apr 1946, Clemens [AQ216898] (BRI). LEICHHARDT DISTRICT: Apis Ck, ca 40 km N of Marlborough, 22°40'S, 149°35'E, Apr 1975, *Craven* 3145 (BRI,CANB); Wolfgang Peak, 22°33'S, 147°50'E, Mar 1988, *Forster* 3609 (BRI). PORT CURTIS DISTRICT: Dan Dan S.F., 24°10'S, 151°05'E, Dec 1987, *Gibson* [AQ408480] (BRI*). BURNETT DISTRICT: 4.5 km NNE of Monogorilby, 26°01'S, 151°01'E, Dec 1981, *Forster* 988 (BRI*). WIDE BAY DISTRICT: Mt Glastonbury, 26°14'S, 152°29'E, Jan 1987, *Forster & Sharpe* 2875 (BRI*). MORETON DISTRICT: Flinton Hill, Worlds End Pocket, 27°31'S, 152°45'E, Dec 1987, *Forster* 3309 (BRI*). New South Wales, Sandiland Ranges, Nov 1904, *Boorman* (NSW). New Caledonia, Magenta, Noumea, Dec 1960, *McKee* 7835 (CANB); Ouen Toro, hill at S end of Noumea, Jan 1982, *McPherson* 4560 (BRI; MO *n.v.*).

Distribution, habitat and ecology: *S. elliptica* is widely distributed in the Philippine Islands, Malesia, New Guinea, in northern and eastern tropical to subtropical Australia (Map 1), and New Caledonia. *S. elliptica* occurs as a woody liane in the canopy of numerous rainforest types, including semi-evergreen vine thicket, araucarian microphyll vine forest, araucarian notophyll vine forest, notophyll vine forest and low microphyll vine forest, on a variety of soil types including red krasnozems, red euzozems, black earth and quartz sands, and on different types of rock outcrops. It is commonly used as a host plant by larvae of *Euploea core corinna* (MacLeay) (Common Crow Butterfly) (Sankowsky 1975), which feeds on a wide range of Asclepiadaceous hosts (Scheermeyer & Zalucki 1985; Forster 1987).

Seed germinates within 3–4 days of planting if fresh and the seedlings (Fig. 4B) make rapid growth, reaching 50–80 cm in height during the first growing season.

Phenology: Flowering occurs from October to April, fruiting from March to June.

Notes: The type sheet of *S. elliptica* at BM has two labels in Brown's handwriting attached. One has "Cynanchum glabellum, Brown No. 8, Carpentaria main opp... Groote Islands" and the other has "Cynanchum, Brown No. 9, Coen River". At the base of the sheet is written "Secamone elliptica R. Br." in Brown's handwriting. There is no way of telling whether the sheet is a mixed collection of material from two different localities as there are several discrete pieces of material attached. Hence the piece directly in the middle of the sheet has been selected to preserve the application of Brown's name to an elliptic leaved specimen.

The localities for Cuming's type collections of *S. attenuata* and *S. multiflora* are taken from the listing of Merrill (1915). The isotype sheets at K of *S. attenuata* have 'Prov. Batangus, Luzon' and of *S. multiflora* have 'Prov. Albay, Luzon' on the labels. According to Merrill, all of Cuming's collections were distributed with labels stating "Ins. Philippinae 1841" although many did not actually come from The Philippines. According to Merrill (1903), complete sets of Cuming's collections exist at B (presumably now destroyed), BM, K and P, with partial sets at G, L and a number of other herbaria.

Warburg (1894) in describing *S. papuana* did not provide a formal description, however his sentence "Corona squamae 5, tubo stamineo nune brevis-sime nune alte adnatae, a latere compressae, apice liberae rectae vel incurvae." may be construed as a diagnosis. No specimen was cited and the above collection of Warburg's which is labelled "Secamone papuana Warb." is selected as lectotype.

S. elliptica is a very variable species particularly with respect to leaf length, width and shape as demonstrated by Figures 1–3. There appears to be no strong geographical correlation of this leaf variation within Australia, although a greater proportion of herbarium records from the southern parts of the range tend to have elliptic to narrow-elliptic leaves. Examination of any population in the field generally reveals branches with leaves that vary from narrow-elliptic to elliptic to broadly lanceolate-elliptic or ovate, depending on the conditions of growth. Similarly there is no geographic correlation of plants with either solitary or compound cymes as can be seen from Figures 1a and 4a, both from plants in the southern part of the range with elliptic leaves. Some minor variation in floral characters such as corona size, corona lobe size and shape, pedicel length, sepal size, corolla size and calycine gland number occurs (Figures 1–3) but this is no more than occurs in many taxa of Asclepiadaceae and shows no geographical or ecological correlation. Hence there is little basis on which to recognise *S. ovata*, *S. elliptica*, *S. micrantha*, *S. multiflora*, *S. attenuata*, *S. lanceolata*, or *S. flavida* as distinct species. The name *S. elliptica* is applied here because, of the earliest two names available (the other being *S. ovata*), it has been more commonly used.

Conservation status: The species is widespread and not endangered in any way.

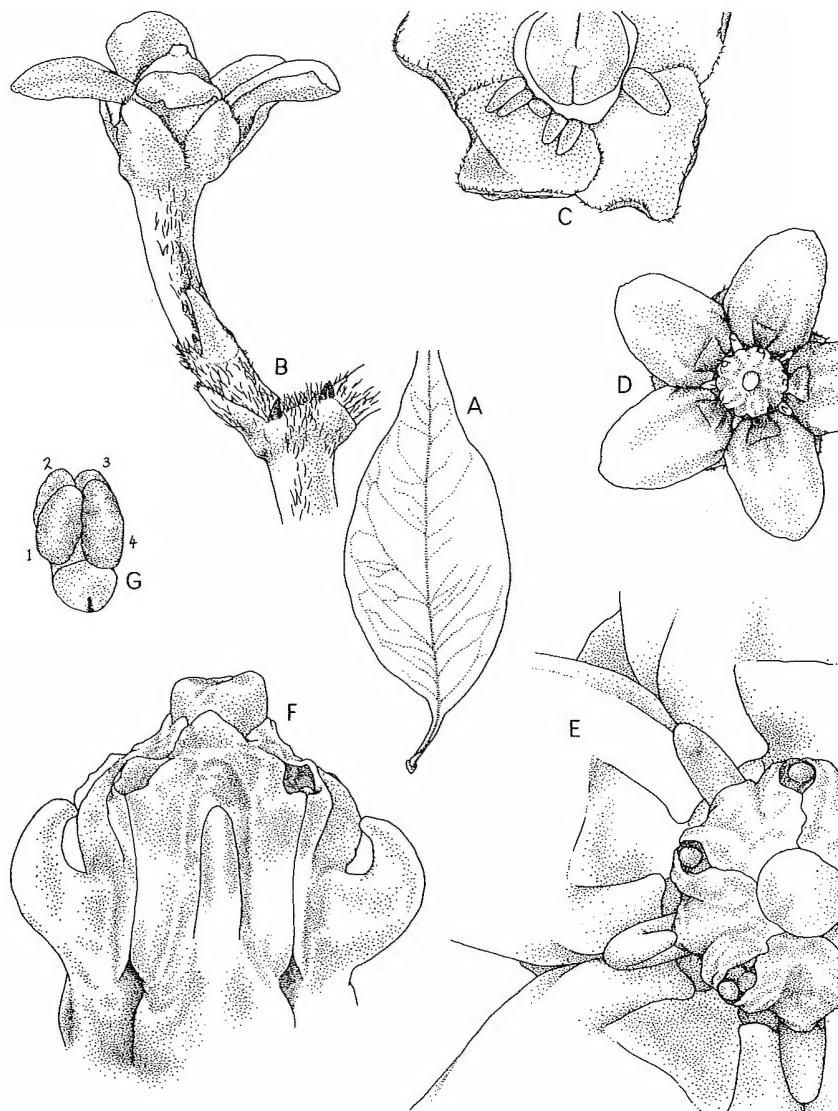


Fig. 3. *Secamone elliptica*: A. leaf (tip lost) $\times 1$. B. single flower $\times 10$. C. flower with gynostegium and corolla removed showing ovaries and glands at sepal bases $\times 20$. D. apical view of flower $\times 10$. E. apical view of staminal corona $\times 40$. F. side view of staminal corona with style-head protruding $\times 40$. G. pollinarium $\times 70$. All from Stobo AQ440519.



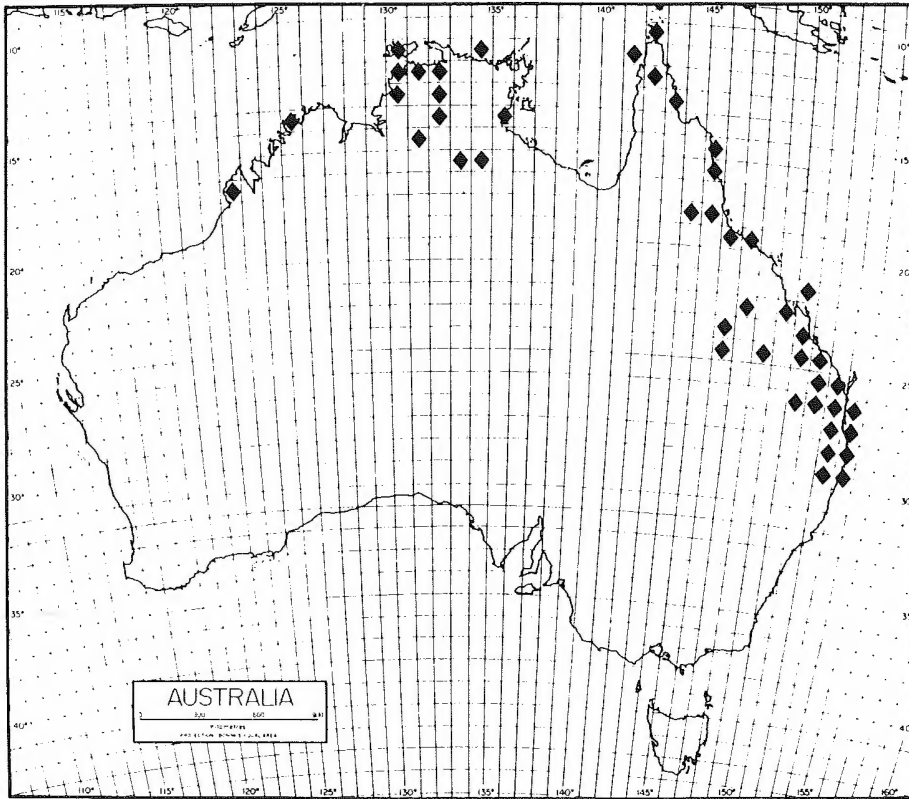
Fig. 4. *Secamone elliptica*: A. tip of flowering stem with elliptic leaves and much branched cyme $\times 1$. B. seedling $\times 1$. C. follicles $\times 1$. D. seeds $\times 1$. A, Forster 3309; B, Forster 310: Stony Ck, 25°29'S, 151°54'E, C-D, Forster 533: Mt Blandy, 25°24'S, 151°46'E.

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Map 1. Distribution of *Secamone elliptica* in Australia mapped at 1:250 000 grid scale.

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